
Drosophila models of epithelial stem cells and their niches.

Journal: Wiley Interdiscip Rev Dev Biol

Publication Year: 2012

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PubMed link: 23801493

Funding Grants: Training Program in Stem Cell Research at UCSF

Public Summary:

Scientific Abstract:

Epithelial stem cells are regulated through a complex interplay of signals from diffusible ligands, cellular interactions, and attachment to the extracellular matrix. The development of *Drosophila* models of epithelial stem cells and their associated niche has made it possible to dissect the contribution of each of these factors in vivo, during both basal homeostasis and in response to acute damage such as infection. Studies of *Drosophila* epithelial stem cells have also provided insight into the mechanisms by which a healthy population of stem cells are maintained throughout adulthood by demonstrating, for example, that stem cells have a finite lifespan and may be displaced by replacement cells competing for niche occupancy. Here, we summarize the literature on each of the known *Drosophila* epithelial stem cells, with a focus on the two most well-characterized types, the follicle stem cells (FSCs) in the ovary and the intestinal stem cells (ISCs) in the posterior midgut. Several themes have emerged from these studies, which suggest that there may be a common set of features among niches in a variety of epithelia. For example, unlike the simpler *Drosophila* germline stem cell niches, both the FSC and ISC niches produce multiple, partially redundant, niche signals, some of which activate pathways such as Wnt/Wingless, Hedgehog, and epidermal growth factor (EGF) that also regulate mammalian epithelial tissue renewal. Further study into these relatively new stem cell models will be of use in understanding both the specifics of epithelial regeneration and the diversity of mechanisms that regulate adult stem cells in general. WIREs Dev Biol 2012, 1:447-457. doi: 10.1002/wdev.36 For further resources related to this article, please visit the WIREs website.

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